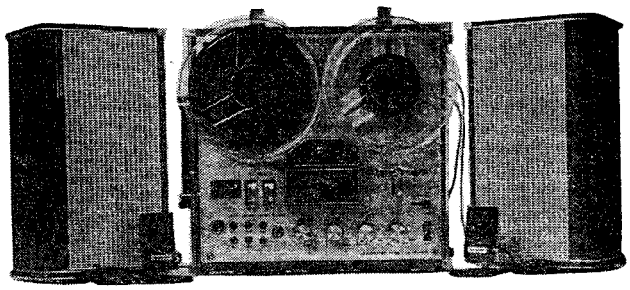
SANYO



Solid State Stereophonic Tape Recorder
4-track, 2-channel System

MODEL MR-909

SERVICE MANUAL

SPECIFICATIONS

Recording system ····· AC magnetic biasing 4-track stereo
Erasing system ····· AC magnetic erasing
Transistors ····· 2SB303×2 1st amplifier
2SB186×2 2nd amplifier
2SB186×2 3rd amplifier
2SB186×2 4th amplifier
2SB373×4 Power amplifier
2SB272×2 AC biasing oscillator
Diodes and other elements ····· 1S188×2 Audio level detector
Selenium rectifier
Tape speed ····· 7-½ ips (19 cm/sec), 3-¾ ips (9.5 cm/sec)
Playing time ····· 7-½ ips 120 minutes (double tracks)
3-¾ ips 240 minutes (double tracks)
Fast forward and rewind time ··· Less than 3 minutes (at 7″ tape)

Frequency response ····· 30 - 13000 cps (at 7-½ ips)
70 - 7000 cps (at 3-¾ ips)
Power output ····· Maximum 3 watts (each channel)
Undistorted 2.5 watts (each channel)
Input and output ····· Microphone jacks 25K ohms
Auxiliary jacks 100K ohms
Head phone jack 10K ohms
Line output jacks 1K ohms
Speaker ····· 4″ free edge permanent dynamic, impedance 8 ohms
Power source ····· 90/100/117/220/240V AC, 50/60 cps.
Dimensions (W×D×H) ··· Main Unit 13″×5½″×12¾″ (33×14×32cm)
Speaker Box 6½″×5¼″×12¾″ (16×13×32cm)
Weight ····· 38 lbs. (17 kg)

REMOVING MECHANISM FROM CABINET

In order to repair the mechanism or amplifier, it is necessary to remove the recorder unit from the cabinet. To remove, observe the following instructions:

1) Place the recorder upside down and remove five philips screws on the bottom of the cabinet.
2) Turn the recorder to normal position and remove four philips screws at the four corners of upper panel and a screw in the head housing.
3) Remove two volume control knobs, two tone control knobs and recording knob by pulling upward. Remove operating lever by turning counter-clockwise.

Above procedures will permit the removal of mechanism and amplifier from the cabinet.

ADJUSTMENT OF MECHANISM

When inadequate operation is noticed in fast forward or rewinding, or when unusual slackening of tape occurs at the time of changing (switching) from stop to play, or when improper tension is noted on the tape in each operation, while the tape recorder is operating properly otherwise, the following adjustments are required.

1) Measuring Equipment.

Although no measuring equipment or tool is required, tension gauge (500g with 20g scale, 2kg with 100g scale) will be useful after adjustment.

2) Brake Mechanism.

For operation at regular speed (record - playback) and for changing from fast forward to stop, the brake should apply strongly to feed reel base and weakly to takeup reel.
Turn the adjusting screw to adjust contact to the reel base. (See Fig. 1).
When the brake doesn't apply, it causes an opening of over 0.5mm between reel base and brake shoe. Therefore, the brake shoe should touch the reel base smoothly.

3) Fast Wind Mechanism.

There must be no aperture between the takeup reel base and the screw for fixing takeup reel base. Should there be an aperture at fast winding, it is necessary to change the nylon washer for a thicker one, or to move the lever upward a little to uphold the fixing metal so that the pressure between reel base and pulley becomes satisfactory (See Fig. 2).
Check the rotation of feed reel base. After completing this adjustment, function 'Rewind' and 'Playback', and check for defective operation and unusual noise.

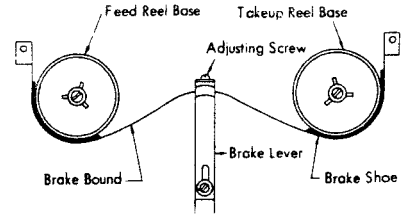


Fig. 1

4) Rewind Mechanism.

If the nut (1) is worn out, the rewinding roller pressure against feed reel will increase gradually. Tighten nut (2) so that the rewind operation can be completed within 3 minutes for a full 7″ reel tape. After making this adjustment, tighten the nut (2) to clamp the nut (1). This will be followed by lacquer fixing. Check the tension of takeup reel base, contact between brake and reel base, and also for unusual noise.

Note : Pay particular care when shifting the operating lever so that its position will be correct (See Fig. 3).

5) Playback Mechanism

Pressure between the pinch roller and capstan (flywheel shaft) is to be gauged; satisfactory tension is between 650 to 950g. To take the reading, playback the tape at 9.5cm (3-3/4″)/sec. speed, pull the pinch roller toward you until the tape stops, and read the tension gauge. This process should be repeated two or three times, and adjustment is made with coil spring (See Fig. 4).

6) Adjusting Pad

The felt should be placed so that it will come into contact with the head core slit at the right angle and that the center of the felt properly meets the core slit section. The felt should firmly contact the entire width of the tape. The pressure between the pad and head should be measured, satisfactory tension is between 20 to 25g.

MAINTENANCE

1. Oiling (Lubrication)

When excessive oil is applied, it may overflow along the shaft and adhere to the rubber parts of the belt and pinch roller, causing slipping, wow or flutter. Care should be taken to limit the amount of oil applied or on how to oil.

2. Oiling Parts.

Pinch Roller (Fig. 5), Flywheel Shaft (Fig. 6),
Rewind Roller (Fig. 7), Motor,
Reel Base and Reel Base Pulley (Fig. 8), Counter and Pulley, Idler

3. Oiling of Other Parts.

Oiling of the revolving parts is mentioned above. It is essential to clean and oil metal-to-metal contact surface, shaft and bearing of each lever at least once a year.

4. Cleaning the Tape Transport Sections.

The tape travels from the feed reel to pinch roller through two tape guides, erasing head, recording head, pad, tape guide and capstan. When dust or ferrous powder on the tape adheres to these parts, insufficient erasing, non-recording, poor high tones, less volume and slipping may result. Utmost care should be taken to clean these parts.

Parts such as tape guide, each head, pinch roller and capstan should be throughly cleaned with a soft cloth or gauze soaked in carbon tetrachloride.

5. Oiling Rotating Parts.

All rotating parts of this set are of oil-less metal, except for reel spindle, rewind roller, and fast forward roller. To insure smooth functions, oil-less metal parts are sealed from exposition to air. Accordingly, these parts must be disassembled before applying lubricant.

6. Storing

Before closing the lid of tape recorder ····· after operation or when storing ····· make sure the control is set to "STOP" position.

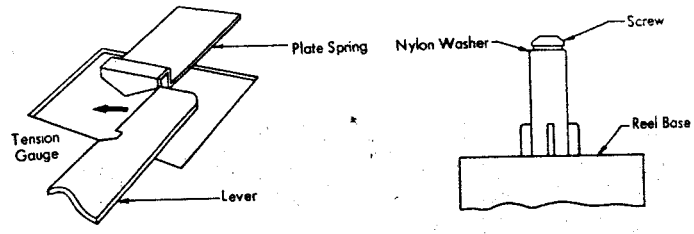


Fig. 2

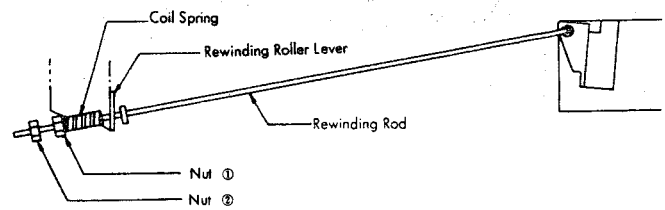


Fig. 3

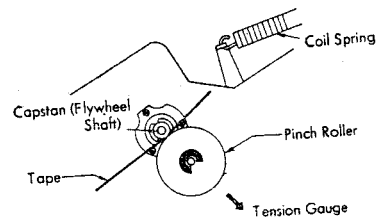


Fig. 4

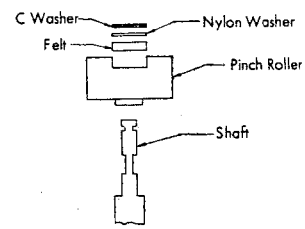


Fig. 5

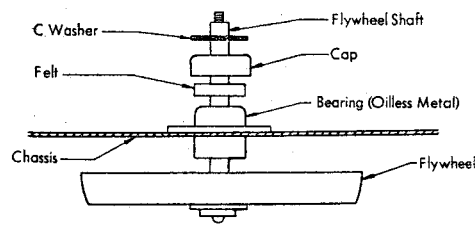


Fig. 6

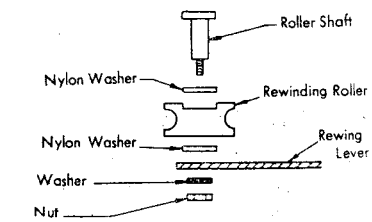


Fig. 7

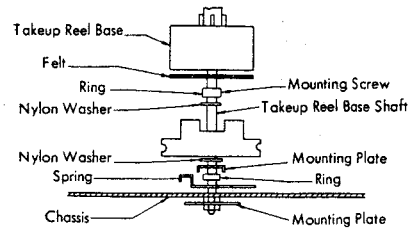


Fig. 8

MECHANICAL TROUBLE CHART

SYMPTOM	CAUSE	REMEDY
Capstan doesn't rotate	Motor trouble.	
	1. Coil failure.	Replace.
	2. Metal bearing burnt.	Lubricate or replace.
	3. Foreign material between rotor and stator.	Remove foreign material or replace.
	4. Oil adheres to motor pulley or rubber belt.	Clean with carbon tetrachloride or alcohol.
	5. Flywheel shaft burnt or oil shortage.	Lubricate or repair.
	6. Rubber belt loosened.	Repair or replace.
	7. Capstan sleeve loosened.	Tighten.
	8. Motor pulley loosened.	Tighten.
Wow & Flutter.	Defective motor.	
	1. Foreign material between rotor and stator.	Remove foreign material or replace.
	Slipping Tranmission Mechanism.	
	1. Foreign material on flyweel.	Clean with carbon tetrachloride or alcohol.
	2. Foreign material on rubber belt.	-ditto-
	3. Flywheel shaft bent or inclined.	Replace.
	Defective Tape Transport.	
	1. Lack of pinch roller pressure.	Adjust pinch roller pressure to 650-950g.
	2. Foreign material on pinch roller or transformation.	Clean with carbon tetrachloride or alcohol.
	3. Dust adheres to tape transport slot.	-ditto-
Reel base doesn't when reel is not placed.	Defective Winding.	
	1. Defective rubber belt.	Clean (ditto) or replace.
Reel base doesn't rotate when reel is placed.	Defective Winding.	
	1. Slipping of pulley, flywheel, reel base pulley.	-ditto-
	2. Takeup reel base or pulley lacks oil.	Lubricate.
	3. Feed reel base lacks oil.	Lubricate.
	4. Rewind roller doesn't contact reel base or belt.	Adjust rewind roller pressure to 500-600g
Brake doesn't work.	1. Brake folding under.	Adjust or replace.
	2. Poor brake adjustment.	Adjust brake position or replace.
Unable to record. (RP select switch doesn't work)	1. Select level coil spring broken.	Replace.
	2. Foreign material on RP select switch.	Clean with carbon tetrachloride or alcohol.
Imperfect erasing.	1. Erasing head wrong position.	Adjust height or put forward.
	2. Erasing head slit dirty.	Clean with carbon tetrachloride or alcohol.
	3. Weak pressure of head pad.	Adjust coil spring pressure to 20-25g or replace felt.
	4. Dust adheres to tape guide.	Clean with carbon tetrachloride or alcohol.
Motor noise	1. Rotation noise.	Lubricate or replace.
	2. Loosened screw of motor.	Tighten.
Reel base noise.	1. Brake shoe contacts reel base.	Repair or replace.
Defective tape counter.	1. Wrong counter gear.	Repair or replace.
Defective transmission mechanism.	1. Oil adheres to rubber belt.	Clean with carbon tetrachloride or alcohol.
	2. Loosened rubber belt.	Repair or replace.

ELECTRICAL TROUBLE CHART

SYMPTOM	CAUSE	REMEDY
When switch is turned on, but pilot lamp doesn't light.	1. Defective power cord.	Repair or replace.
	2. Blown or loosened fuse.	Replace.
	3. Defective power switch.	Replace.
	4. Defective power transformer.	Replace.
Pilot lamp lights up but motor doesn't rotate.	1. Defective motor.	Replace.
	2. Defective spring switch.	Replace.
	3. Defective starting capacitor.	Replace.
B-power voltage is not applied.	1. Defective rectifier.	Replace.
	2. Smoothened circuit failure C106 or C107.	Replace.
	3. Short of B power supply load.	Check voltage of each section.
	4. Defective power transformer B winding.	Replace.
	5. Lack of power supply voltage on AC current.	Check and adjust.
Unable to record and reproduce (CH-1, CH-2) .	1. Defective amplifier.	Check voltage and gain. Replace.
	2. Defective RP head.	Replace.
	3. Poor contact between tape and RP heads.	Check tape loading and head contact section. Adjust.
	4. Switch (S14) failure.	Repair or replace.
	5. SP, Headphone, Line out jacks failure.	Repair or replace.
	6. Shortage between head and amplifier leads.	Repair.

SYMPTOM	CAUSE	REMEDY
Unable to record and reproduce (CH-1).	1. Defective amplifier.	Check and replace.
	2. Defective SP head phone jacks.	Repair or replace.
	3. Short or broken leads between head and amplifier.	Repair.
Reproduces but doesn't record (CH-1, CH-2).	1. RP select switch failure or wrong contact.	Repair or replace.
a) Indicator doesn't work.	1. Defective indicator or indicator circuit.	Repair or replace.
	2. Defective microphone.	Replace.
	3. Microphone, Aux. jacks failure.	Repair or replace.
b) Indicator is normal.	1. Failure or short of constant current (R-25 or R-75).	Repair or replace.
	2. Defective oscillator circuit.	Check and repair.
c) Confused recording (imperfect erasing of former recording)	1. Defective erasing head.	Check and repair.
d) Confused recording (confusion of CH-1 and CH-2)	1. Defective adjustment of RP head angle.	Check and repair.
Records but doesn't reproduce (CH-1, CH-2).	1. Defective select switch or poor contact select switch.	Repair or replace.
	2. Defective SP, head phone.	Replace.
	3. Defective jacks of Sp, head phone and line out.	Repair or replace.
	4. Magnetized erasing head.	Demagnetize or replace.
CH-1 (or CH-2) records and reproduces, but CH-2 (or CH-1) doesn't reproduce.	1. SP head phone failure.	Replace.
	2. SP, headphone, and line out jacks defective.	Repair or replace.
Noise (CH-1, CH-2).	1. Biasing oscillator wave distortion.	Adjust circuit.
	2. Defective motor.	Repair or replace.
	3. Magnetized RP head.	Demagnetize with demagnetizer.
Much noise only in CH-1 (or CH-2).	1. Defective contact VR 1-1, 1-2, 1-3 (or VR 2-1, 2-2, 2-3)	Replace.
	2. Defective transistor (especially TR 1-1 or TR 2-1)	Replace.
	3. Defective circuit elements.	Replace.
	4. Contact among elements on CH-1, or defective soldering.	Replace.
Loud noise when connecting microphones.	1. Lack of capacity in filter circuit (C 105, C 106, C 107).	Replace.
Much noise only in CH-1 (or CH-2).	1. Lack of capacity in filter circuit (C2, C10, or C52, C10).	Replace.
	2. Bad earth.	Repair.
	3. Defective microphone.	Replace.
	4. Bad insulation of C1 (or C51).	Replace.
Bad tone (only one channel).	1. Bad circuit elements or transistors.	Replace.
	2. Inadequate AC bias.	Adjust.
	3. Worn head.	Replace.
	4. Bad microphone.	Replace.
	5. Bad speaker.	Replace.
Lack of high tone (only one channel).	1. Bad angle of RP heads.	Adjust angle with standard tape at 7,000 c/s.
	2. Inadequate capacity of C12 (or C62).	Repair.
	3. Inadequate capacity of C15 (or C65).	Repair.
	4. Excessive capacity of C19, C21 (or C64, C71).	Repair.
	5. Not enough pressure of RP heads pad or dust adheres to slit part.	Repair or clean.
	6. Bad speaker.	Replace.
	7. Inadequate operation of AC bias oscillator circuit.	Set 200 mA of AC bias current.
Lack of low tones.	1. Inadequate capacity of C7, C6, R14 (or C57, R64, C56).	Replace.
Unable to erase.	1. Erasing head broken or short.	Replace.
	2. Bad position of erasing head.	Adjust erasing head position.
	3. Lack of erasing current.	Repair.
	4. Bad contact of tape and erasing head.	Clean.
Cross talk between top and bottom tracks.	1. Bad position of tape guide and wobbling of tape.	Adjust tape guide and head position.
Poor volume.	1. Defective circuit elements	Check and replace.
	2. Bad circuit elements or poor contact with adjoining elements and defective soldering.	Adjust or replace.
	3. Defective biasing oscillator circuit.	Check and repair.
	4. Defective head, microphone and speaker.	Check and replace.
Much hum.	1. Defective contact of RP heads with amplifier.	Check and repair.
	2. Close arrangement of RP lead wire.	Move as far as possible.
	3. Defective wiring of RP heads.	Move motor away from AC cord and fix appointed position.
	4. Small capacity in smoothed circuit of amplifier C10, C106, C107 (or C60).	Check and replace.
	5. Defective earth circuit.	Check and repair.

PARTS LIST

CABINET ASSEMBLY

SYMBOL NO.	STOCK NO.	DESCRIPTION	Q'ty
	R-S9026e	Cabinet (complete)	1
	R-S9027a	Speaker box (complete)-for right side speaker	1
	R-S9028a	Speaker box (complete)-for left side speaker	1
	R-423896	Protection paper-for upper panel	1
	R-261000	Upper panel-deck panel	1
	R-32436	Ring-mounting on upper panel	2
	R-32435a	Counter sign board-tape counter	1
	R-39148	Decoration base-for shift lever	1
	R-38057	Lamp cover-for pilot lamp	1
	R-32433	Retaining base-for lamp cover	1
	R-39173	Blindfold - for lever of record knob	1
	R-423848	Insulation paper-attached on rear of upper panel	1
		Felt - 10×10×3t - attached on upper panel	1
	R-44222a	Stopper-for shift lever	1
	R-24888a	Split pin-for head cover	4
	R-38947	Back cover-for speaker box	2
	R-24889	Ring-for retaining upper panel	4
	R-39130	Knob-for shift lever	1
	R-S8948	Knob-volume and tone control knob	4
	R-S8949	Head cover-trapezoid type	1
	R-S8950	Head cover-rectangular type	1
	R-37030	Button-record button	1
	R-44224	Rubber cap-for reel spindle	2
	R-41369	Foam washer-for VU meter	4
	R-11668	Metal washer-for chassis mounting	5
		Ring-3.3ø×8ø×3.6t-for retaining upper panel	1
		Knob felt-20ø×10ø×1t-for volume and tone controle knobs	4
		Felt-10×13×19-attached on inside of head cover	1
		Plastic washer-6.5ø×3.3ø×0.5t-for retaining upper panel	5
		Fiber washer-1ø×11ø×0.8t-inserted into caps	2

CHASSIS ASSEMBLY - 1

SYMBOL NO.	STOCK NO.	DESCRIPTION	Q'ty
	R-112178	Chassis-control amplifier section	1
	R-112179d	Chassis-power supply secton	1
	R-112183	Mounting plate-for chassis mtg.	1
	R-112184	Mounting angle-for upper panel mtg.	2
	R-112182	Mounting plate-for chassis mtg.	1
	R-112185a	Lever -for record	1
	R-112186	Adjusting metal-for record/play switch	1
	R-14144	Screw-for record/play switch	1
	R-24804a	Shaft-for record/play switch	2
	R-12246	Spring-for record/play switch	1
	R-12247	Spring-for record/play switch	1
	R-112177	Mounting plate-for power transistor (2SB373)	1
	R-36159	Instruction panel-power supply and speaker	1
	R-112028	Strap-fixing electrolytic capacitor	1
	R-112203	Reinforce metal-for mounting power trans.	2
	R-32430	Mounting base-for input jacks	1
	R-41365b	Printed wiring board-control amplifier section	2
	R-41366	Printed wiring board-biasing oscillator section	1
	R-41396	Printed wiring board-power transistor section	2
	R-34111	Mounting base-for speaker output jacks	1
	R-112173L	Shift lever seat-for shift lever	1
	R-24876	Spacer-for shift lever	1
	R-12011	Lead clamp lug-for circuit wire	1
	R-112300	Shielding plate-for power trans.	1
	R-11738	Cover-for pilot lamp	1

CHASSIS ASSEMBLY - 2

SYMBOL NO.	STOCK NO.	DESCRIPTION	Q'ty
	R-44033	Rubber tube-for pilot lamp	1
		Fiber washer-4.2ϕ×7ϕ×0.5t-for mtg. lever (R-112185a)	2
		Felt-8ϕ×1t-for spacer between chassis and upper panel	4
		Felt-7×10×15-for spacer between chassis and upper panel	2

MAIN ELEMENT

SYMBOL NO.	STOCK NO.	DESCRIPTION	Q'ty
	TM-7	Mechanism assembly	1
	R-W7071	Power transformer-prim: 90V, 100V, 117V, 220V, 240V and 9V. second: 14V	1
	R-W6177	Input transformer-1K ohm : 500 ohms×2	2
	R-W8143	Oscillator coil	1
VR1-1 VR2-1	R-R124123	Volume control-5K ohms type-B	2
VR1-2	R-R124131	Volume control-10K ohms type-A	1
VR2-2	R-R124122	Volume control-with switch, 10K ohms type-A	1
VR1-3 VR1-4 VR2-3 VR2-4	R-R11013	Semi-fixed resistor-10K ohms type-B	4
VR1-5 VR2-5	R-R11015	Semi-fixed resistor-500K ohms type-B	2
	R-S5527	VU meter-level indicator	2
	R-W1034	Choke coil-3mH	2
	R-S4274a	On-off switch-rocker type	1
	R-S4275	Muting switch-recording switch	1
	R-S6294	Speaker-4″ free edge permanent dynamic, impedance 8 ohms	2
	R-S6293a	Microphone-directional dynamic, impedance 200 ohms	2
	2SB303	Transistor-1st audio amplifier (for each channel)	2
	2SB186	Transistor-2nd audio amplifier (for each channel)	2
	2SB186	Transistor-3rd audio amplifier (for each channel)	2
	2SB186	Transistor-4th audio amplifier (for each channel)	2
	2SB373	Transistor-power amplifier-push-pull (for channel 1)	2
	2SB373	Transistor-power amplifier-push-pull (for channel 2)	2
	2SB272	Transistor-AC biasing oscillator	2
	1S188 or 1N60	Diode-audio level detector (for each channel)	2
	R-S1230	rectifier-selenium rectifier	1

MISCELLANEOUS - 1

SYMBOL NO.	STOCK NO.	DESCRIPTION	Q'ty
	R-S2131	Jack-for headphone	1
	R-S2123	Jack-with switch, for MIC. input	2
	R-S2124	Jack-less switch, for AUX. input, line and SP. output	6
	R-S2028a	Socket-for AC output	1
	R-S2133	9 pin socket-for AC voltage selec.	1
	R-S1227	9 pin plug-for AC voltage selec.	1
	R-S2134	Pilot socket-with retaining angle for VU meter	1
	R-S2125	Pilot socket-with retaining angle	1
	R-39218	Switch base-for record/play switch	2
	R-25144	Terminal-for record/play switch	12
	R-13051b	Flat spring-for record/play switch	4
	R-15141	Pin-for record/play switch	4
	R-S1044	Cartridge fuse-1 amp.	1
	R-S1038	Fuse holder	1
	R-S1203	Pilot lamp-9 volts, 0.1 amp.	2
	R-28085	Heat sink-for transistor (2SB373)	4

SYMBOL NO.	STOCK NO.	DESCRIPTION	Q'ty

MISCELLANEOUS - 2

	R-26627a	Heat sink–for transistor (2SB272)	1
	R-41370	Insulation seat–for Tr. (2SB373)	4
	R-44223	Insulation rubber–for Tr. (2SB373)	4
	R-35247	Plastic washer–for Tr. (2SB373)	8
	R-S8942	Speaker cord–with plug	2
	R-S3134	AC line cord	1
	R-S3005	Tie-points–3-terminals	1

SYMBOL NO.	STOCK NO.	DESCRIPTION	Q'ty

MISCELLANEOUS - 3

	R-S3007	Tie-points–4-terminals	1
	R-S3008	Lead clamp lug	3
	R-S8478	Full 7″ tape reel	1
	R-31304	Empty 7″ tape reel	1
	R-S8678b	Patch cord–with alligator clips	2
		Roll splicing tape	1

SYMBOL NO.	STOCK NO.	DESCRIPTION

FIXED CAPACITORS

C1	R-C9078	5μF			6V	Electrolytic	Vertical
C2	R-C9091a	120μF			10V	〃	〃
C3	R-C9080	30μF			3V	〃	〃
C4	R-C9078	5μF			6V	〃	〃
C5	R-C9080	30μF			3V	〃	〃
C6		0.03μF		±10%	50V	Mylar	Tubular
C7	R-C9126	0.1μF			10V	Electrolytic	
C8	R-C9078	5μF			6V	〃	Vertical
C9	R-C9085a	100μF			3V	〃	〃
C10	R-C9091a	120μF			10V	〃	〃
C11	R-C9079	10μF			3V	〃	〃
C12		0.05μF	+30	−20%	50V	Mylar	Square
C13		0.04μF	+30	−20%	50V	〃	〃
C14	R-C9120	0.2μF			10V	Electrolytic	
C15		0.03μF		±10%	50V	Mylar	Tubular
C16	R-C9078	5μF			6V	Electrolytic	Vertical
C17	R-C9084	5μF			6V	〃	Tubular
C18	R-C9055a	200μF			3V	〃	Vertical
C19		100μF		±10%	50V	Ceramic	Insulated tubular
C20	R-C9135	500μF			10V	Electrolytic	Vertical
C21		100μF		±10%	50V	Ceramic	Insulated tubular
C22		0.005μF	+30	−20%	50V	Mylar	Square
C51	R-C9078	5μF			6V	Electrolytic	Vertical
C52	R-C9091a	120μF			10V	〃	〃
C53	R-C9080	30μF			3V	〃	〃
C54	R-C9078	5μF			6V	〃	〃
C55	R-C9080	30μF			3V	〃	〃
C56		0.03μF		±10%	50V	Mylar	Tubular
C57	R-C9126	0.1μF			10V	Electrolytic	
C58	R-C9078	5μF			6V	〃	Vertical
C59	R-C9085a	100μF			3V	〃	〃
C60	R-C9091a	120μF			10V	〃	〃
C61	R-C9079	10μF			3V	〃	〃
C62		0.05μF	+30	−20%	50V	Mylar	Square
C63		0.04μF	+30	−20%	50V	〃	〃
C64	R-C9120	0.2μF			10V	Electrolytic	
C65		0.03μF		±10%	50V	Mylar	Tubular
C66	R-C9078	5μF			6V	Electrolytic	Vertical
C67	R-C8084	5μF			6V	〃	Tubular
C68	R-C9055a	200μF			3V	〃	Vertical
C69		100pF		±10%	50V	Ceramic	Insulated tubular
C70	R-C9135	500μF			15V	Electrolytic	Vertical
C71		100pF		±10%	50V	Ceramic	Insulated tubular
C72		0.005μF	+30	−20%	50V	Mylar	Square
C101		3100pF		±10%	250V	Styrol	
C102, C103		0.02μF	+30	−20%	50V	Mylar	Square
C104		0.01μF	+30	−20%	50V	〃	〃
C105	R-C9139	500μF			15V	Electrolytic	Tubular
C106	R-C9138	1000μF			15V	〃	〃
C107	R-C9128	2000μF			35V	〃	Vertical

FIXED RESISTORS - 1

R1		100K	ohm	±10%	¼watt.	Carbon film
R2		220	〃	〃	〃	〃
R4		39K	〃	〃	〃	〃

SYMBOL NO.	STOCK NO.	DESCRIPTION				
FIXED RESISTORS - 2						
R5		5.6K	ohm	±10%	1/4 watt.	Carbon film
R6		2.7K	"	"	"	"
R7		5.6K	"	"	"	"
R8		1K	"	"	"	"
R9		100	"	"	"	"
R10		82K	"	"	"	"
R11		10K	"	"	"	"
R12		3.9K	"	"	"	"
R13		1K	"	"	"	"
R14		12K	"	"	"	"
R15		2.2K	"	"	"	"
R16		47K	"	"	"	"
R17		10K	"	"	"	"
R18		1.5K	"	"	"	"
R19		33	"	"	"	"
R20		470	"	"	"	"
R21		1.8K	"	"	"	"
R22		820	"	"	"	"
R23		10K	"	"	"	"
R24		3.3K	"	"	"	"
R25		56K	"	"	"	"
R26		100	"	"	"	"
R27		1.2K	"	"	"	"
R28	R-R7026	1	"	± 5%	"	Wire wound
R29		18	"	±10%	"	Carbon film
R30		1.2K	"	"	"	"
R31	R-R7026	1	"	± 5%	"	Wire wound
R32		18	"	±10%	"	Carbon film
R33		82K	"	"	"	"
R34		100K	"	"	"	"
R35		100	"	"	1/2 watt.	Solid
R36		1.8K	"	"	1/4 watt.	Carbon film
R37		100	"	"	"	"
R38		160	"	"	"	"
R51		100K	"	"	"	"
R52		220	"	"	"	"
R54		39K	"	"	"	"
R55		5.6K	"	"	"	"
R56		2.7K	"	"	"	"
R57		5.6K	"	"	"	"
R58		1K	"	"	"	"
R59		100	"	"	"	"
R60		82K	"	"	"	"
R61		10K	"	"	"	"
R62		3.9K	"	"	"	"
R63		1K	"	"	"	"
R64		12K	"	"	"	"
R65		2.2K	"	"	"	"
R66		47K	"	"	"	"
R67		10K	"	"	"	"
R68		1.5K	"	"	"	"
R69		33	"	"	"	"
R70		470	"	"	"	"
R71		1.8K	"	"	"	"
R72		820	"	"	"	"
R73		10K	"	"	"	"
R74		3.3K	"	"	"	"
R75		56K	"	"	"	"
R76		150	"	"	"	"
R77		1.2K	"	"	"	"
R78	R-R7026	1	"	± 5%	"	Wire wound
R79		18	"	±10%	"	Carbon film
R80		1.2K	"	"	"	"
R81	R-R7026	1	"	± 5%	"	Wire wound
R82		18	"	±10%	"	Carbon film
R83		82K	"	"	"	"
R84		100K	"	"	"	"
R85		100	"	"	1/2 watt.	Solid
R86		1.8K	"	"	"	Carbon film
R87		100	"	"	"	"
R88		160	"	"	"	"
R101, R102		8.2	"	± 5%	1 watt.	"
R103, R104		150	"	±10%	1/2 watt.	Solid
R105		27	"	"	"	"
R106		1K	"	"	"	"
R107	R-R7025a	24	"	± 5%	5 watt.	Wire wound
R108		200	"	±10%	1 watt.	Carbon film

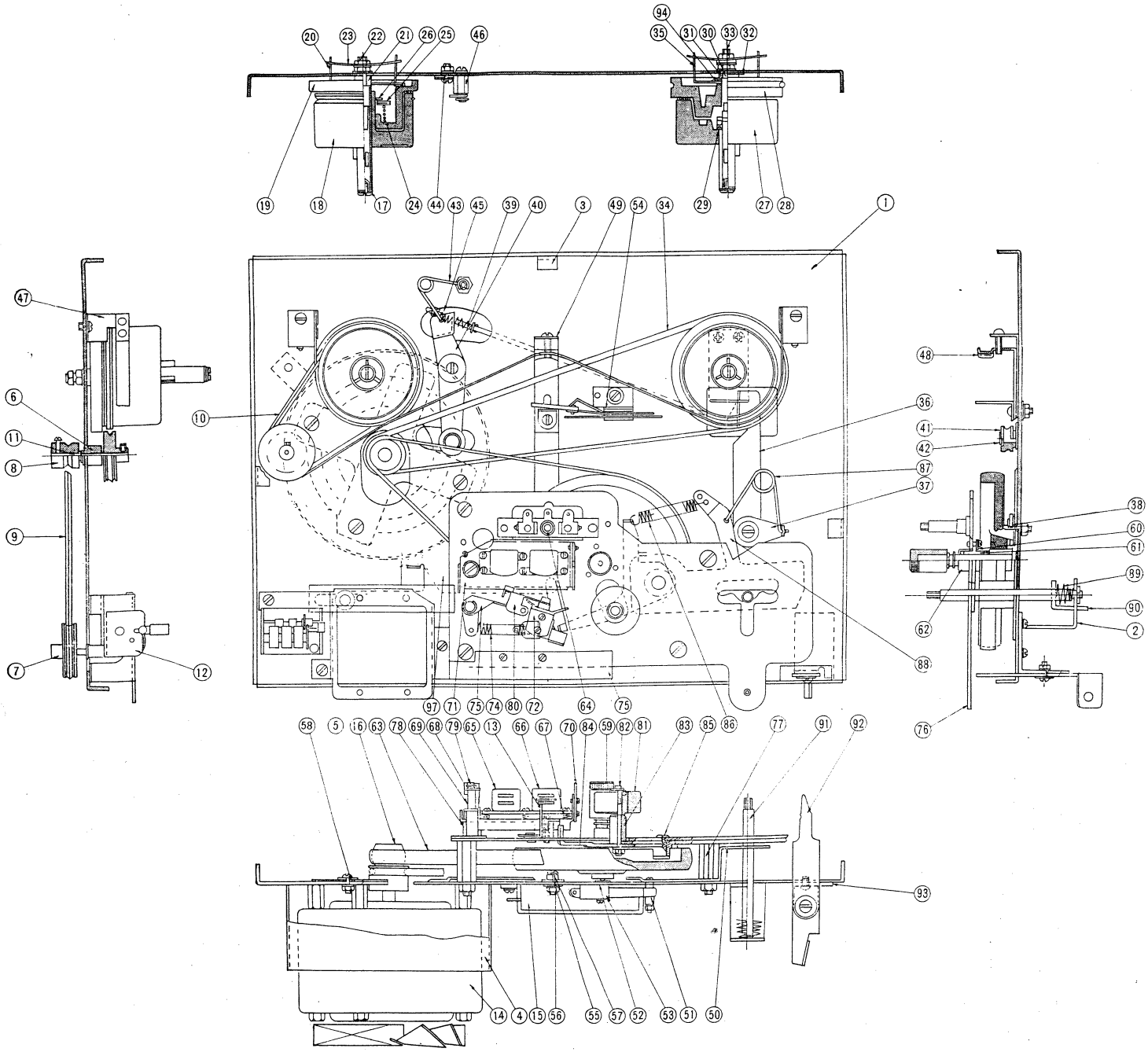
MECHANISM ASSEMBLY - 1

ILLUST. NO.	STOCK NO.	DESCRIPTION	Q'ty
1	R-112163b	Chassis	1
2	R-112164	Retaining metal–for shift lever	1
4	R-112166	Cover–motor cover	1
5	R-112165a	Mounting metal–for level meter & tape counter	1
6	R-24875d	Bearing–counter drive pulley shaft bearing	1
7	R-27038a	Pulley–counter drive pulley	2
		Screw–3×4 for pulley (R-27028a)	2
8	R-27039	Pulley–counter drive pulley	1
		Screw–3×4 for pulley (R-27039)	1
✕ 9	R-44219	Belt–counter drive belt	1
10	R-44243a	Belt–counter drive belt	1
11	R-14138	Shaft–counter drive pulley shaft	1
12	R-S5526	Counter–tape counter	1
	R-S3008	Clamp–lead clamp	4
		Nylon washer–3×6×0.5 for pulley shaft	2
14	R-S5108	Motor–AC motor	1
15	R-C7006	Capacitor–2μF 230v AC	1
	*R-241022	Pulley–motor pulley for 50 cycle	1
	*R-241023	Pulley–motor pulley for 50 cycle	1
	*R-241024	Pulley–motor pulley for 60 cycle	1
	*R-241025	Pulley–motor pulley for 60 cycle	1
		Screw–3×4 for motor pulley	1
	R-S81002	Fan–for motor	1
17	R-24865	Thumbscrew–retaining for supply reel	1
	R-S81085	Reel–supply reel	1
		Felt–32φ×42φ×1t for supply reel	1
18	R-25228	Retaining metal–supply reel pulley bed	1
21	R-24867a	Spacer–for supply reel spindle	1
22	R-14139a	Shaft–supply reel spindle	1
23	R-13060b	Spring–flat spring–back tension spring	1
19	R-34128	Pulley–supply reel pulley	1
		Felt–42Ø×50Ø×1t for supply reel	1
24	R-15229	Spring–for slip mechanism	1
25	R-112407	Washer–for slip mechanism	1
	R-13081	Washer–internal lock washer for slip mechanism	1
		Washer–13φ×28φ×1t fiber washer for slip mechanism	1
17	R-24865	Thumbscrew–retaining for takeup reel	1
	R-S8924	Reel–takeup reel	1
	R-34073	Pulley–takeup reel pulley	1
		Felt–35φ×48φ×1t for takeup reel pulley	1
	R-S8925	Spacer–with 3×3 screw for takeup reel spindle	1
30	R-24667a	Spacer–for takeup reel spindle	1
31	R-24668	Spacer–for fast forward mode pressure	1
32	R-25182	Lever–fast forward mode pressure lever	1
33	R-14140a	Shaft–takeup reel spindle	1
23	R-13060b	Spring–flat spring for back tension spring	1
✕ 34	R-44189	Belt–takeup reel pulley drive belt	1
35	R-25229	Retaining plate–for back tension	1
36	R-112167a	Lever–fast forward & rewind actuating lever	1
37	R-111937	Lever–retaining shift lever tension spring	1
38	R-24672a	Spacer–for lever (R-111937)	1
39	R-24918a	Rod–rewind actuating rod	1
45	R-15208	Spring–rewind actuating rod tension spring	1
41	R-39143	Pulley–rewind mode pulley	1
42	R-12192	Shaft–rewind pulley shaft	1
43	R-15207	Spring–rewind pressure lever return spring	1
44	R-24670	Spacer–for rewind pulley shaft	1
46	R-24919	Retaining post–for rewind lever tension spring	1
47	R-S8926	Brake (complete)	1
48	R-111960	Mounting bracket–brake adjustment	1
49	R-111803a	Slide–brake actuating slide	1
50	R-111802b	Lever–brake actuating lever	1
51		Pipe–for control muting switch	1
52	R-423133	Insulation seat–for muting switch (R-S4287)	1
53	R-S4287	Switch–muting switch for amplifier S14	1

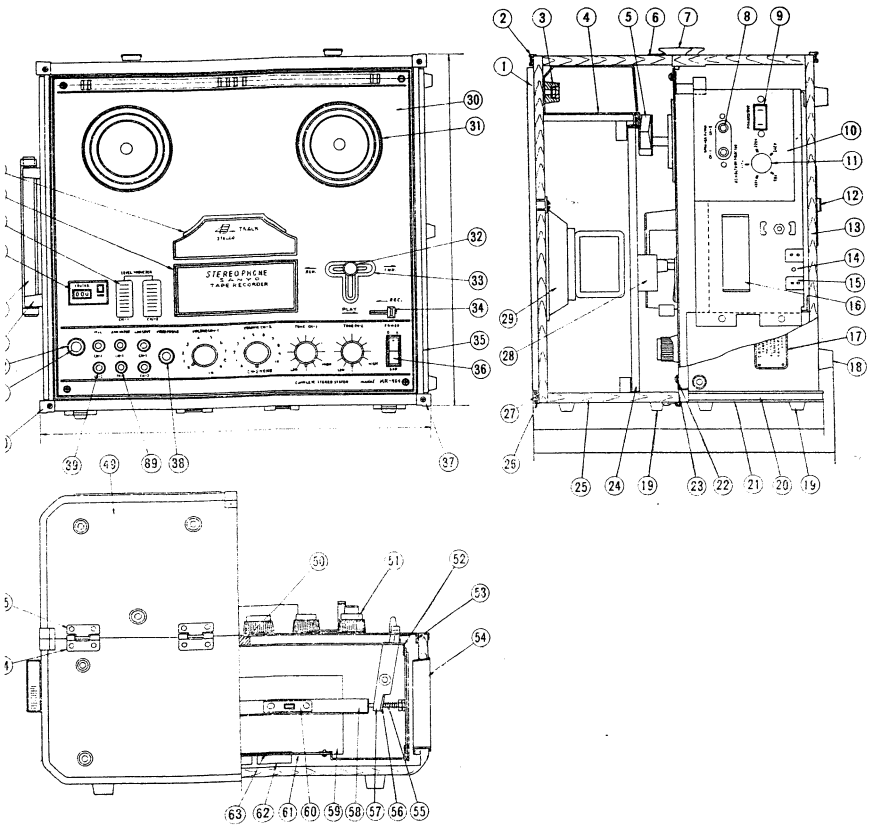
MECHANISM ASSEMBLY - 2

ILLUST. NO.	STOCK NO.	DESCRIPTION	Q'ty
	R-24670	Spacer–retaining brake slide	2
54	R-S4272	Switch–muting switch for motor S19	1
55	R-24671a	Spacer–for brake slide	2
56	R-24686	Spacer–for brake slide	1
57	R-24666	Spacer–for brake slide	1
58	R-24697	Spacer–for brake lever	1
59	R-S8927	Flywheel–with capstan sleeve	1
61	R-25232	Bearing–flywheel bearing	1
60	R-112323	Mounting metal–mount to flywheel bearing	1
62	R-23754	Cover–flywheel bearing cover	1
		Felt–6φ×10φ×2t for flywheel	1
		Fiber–10φ×10.5t flywheel bed	1
✕ 63	R-44230	Belt–capstan drive belt	1
64	R-S8928	Switch–pre-emphasis switch & capstan threaded pin	1
65	R-S6291	Erase head	1
66	R-S6292	Record/playback head	1
67	R-15206	Spring–head azimuth adjustment spring	2
68	R-12237	Pipe–for tape guide post	2
69	R-12148a	Sleeve–for tape guide post	1
70	R-23747a	Tape guide–tape guide post	1
71	R-23732	Mounting plate–mount to heads	1
72	R-29011a	Pad plate–tape pressure pad plate	1
		Felt–for tape pressure pad felt	2
73	R-112170a	Retaining bracket–pressure pad bracket	1
74	R-12235a	Spring–pressure pad tension spring	1
75	R-41367	Printed wiring board–for heads circuit	1
76	R-112171	Panel–heads mounting panel	1
77	R-14108	Stud nut–mount to panel	4
78	R-24873	Spacer–for heads mounting plate	2
79	R-24868	Shaft–mount to pressure pad bracket	1
80	R-23751	Pad plate–tape pressure pad plate	1
81	R-44215	Pinch roller	1
		Felt 4.5φ×8φ×2t for pinch roller	1
82	R-12238	Shaft–for pinch roller lever	1
83	R-24874	Pipe–for pinch roller shaft	1
84	R-S8929	Lever–pinch roller lever	1
85	R-14109a	Shaft–pinch roller lever shaft	1
86	R-15176	Spring–pinch roller pressure tension spring	1
87	R-15210	Spring-pad actuating lever tension spring	1
88	R-112277a	Lever–pressure pad actuating lever	1
89	R-15178	Spring–shift lever pressure spring	1
	R-14115	Rod–mount to shift lever	1
91	R-14141	Lever–shift lever	1
92	R-112174	Lever–record mode lever	1
93	R-112175	Mounting plate–mount to lever (R-112174)	1
	R-24672a	Spacer–for record mode lever	1
		Fixed resistor–10 ohms ±5% ¼watt. carbon film R3,R53	2
3	R-112276	Fixing metal	3
13	R-112377	Mounting plate	1
16		Pulley	1
18	R-34143	Reel base	1
20	R-25228	Retaining plate	1
21	R-24867a	Ring	1
26		Speed washer	1
27	R-34143	Reel base	1
28		Pulley	1
29	R-24869	Ring	1
40	R-112278	Lever	1
61	R-25232	Bearing	1
90	R-12172	Rod	1
94	R-25255	Plate spring	1
97	R-112515	Lever	1

CONSTRUCTION DIAGRAM



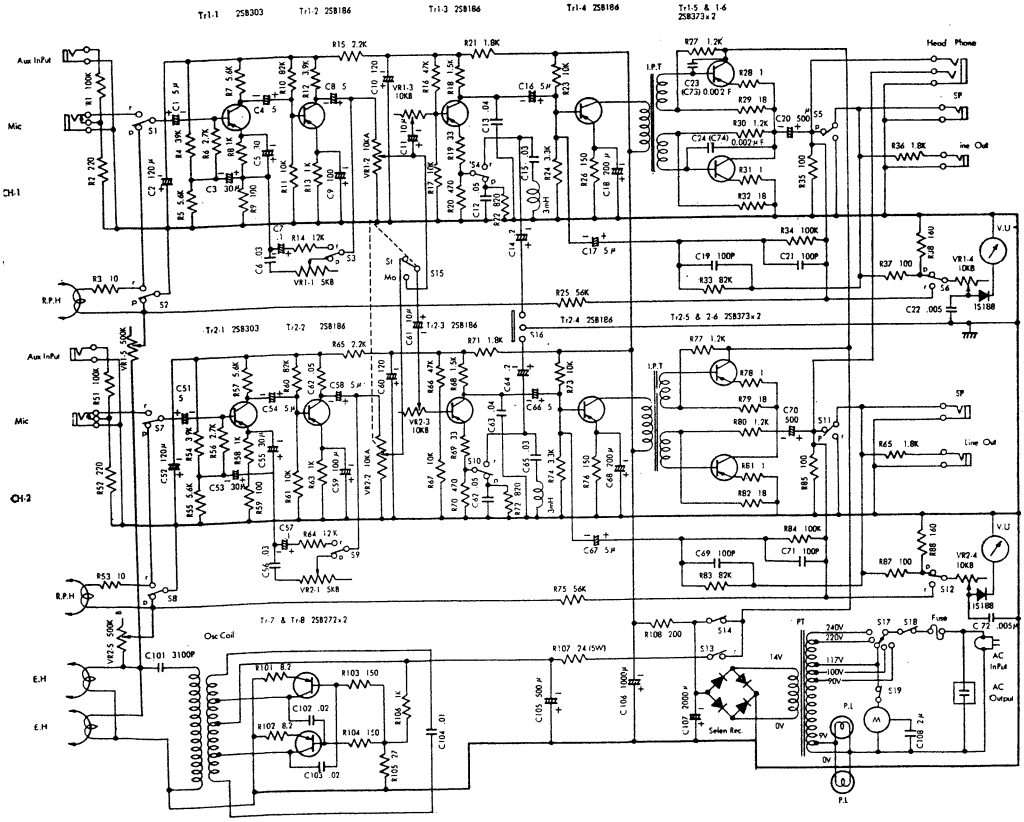
CONSTRUCTION DIAGRAM (CABINET)



DESCRIPTION

ILLUST No.	STOCK No.	PARTS NAME
1	R-31582	Panel
2	R-27036	Corner Proof
3	R-44067	Spacer
4	R-36167	Cover
5	R-44224	Cap
6	R-257460	Fixing metal
7	R-581006	Fixing metal
8	R-52124	Jack
9	R-52028a	Socket
10	R-36159	Name Plate
11	R-51227	Plug
12	R-58733	Lid (complete)
13	R-46400a	Cabinet
14	R-112179	Chassis
15	R-51038	Fuse holder
16	R-C9128	Electrolytic capacitor
17	R-26999	Name plate
18	R-44067	Spacer
19	R-44155	Spacer
20	R-36160	Tape
21	R-27024	Decoration metal
22	R-32213	Washer
23	R-24889	Base
24	R-58947	Rear Lid (complete)
25	R-46401	Speaker box
26	R-27037	Decoration metal
27	R-36161	Tape
28	R-44222	Stopper
29	R-56294	Speaker
30	R-211000	Panel
31	R-32436	Ring
32	R-39130	Knob
33	R-39148	Decoration metal
34	R-39030	Button
35	R-261006	Decoration metal
36	R-54274	See-saw switch
37	R-35352	Cover
38	R-52131	Jack
39	R-52123	Jack
40	R-35251	Jack
41	R-38057	Sign board
42	R-32433	Base
43	R-24887	Fixing metal
44	R-58945	Handle (complete)
45	R-32435	Base
46	R-55527	Meter
47	R-58950	Head cover (complete)
48	R-58949	Head cover (complete)
49	R-46402	Speaker box
50		Felt
51	R-58948	Knob (complete)
52	R-112178	Chassis
53		Felt
54	R-23742	Decoration metal
55	R-12246	Coil spring
56	R-14144	Special screw
57	R-112174	Lever
58	R-112185	Lever
59	R-41365	Printed wiring board
60	R-112186	Adjusting metal
61	R-112177	Mounting plate
62	R-28085	Heat sink
63	R-46396	Printed wiring board
64	R-12130	Hinge
65	R-12129	Hinge

CIRCUIT DIAGRAM



1) S1···S6, S7···S12, S13 (PLAY Position) Recording SW.
2) S14 (PLAY and RECORD Position) Switch ON at Record and Play.
3) S15 (Stereo Position) Stereo, Chan. 1 Monaural Changing SW.
4) S16 (7½ ips Speed Position) Compensative SW.
5) S17 (117V Position) Power Line Changing SW.
6) S18 (ON Position) Power SW.
7) S19 (ON Position) Motor SW, Switch OFF at Stop Position.
8) VR1-1 VR2-1 (5k B type) Tone Control at Play.
9) VR1-2 VR2-2 (10k A type; VR2-2 only Connected with S15)
   Volume Control at Play, Level Control at Record.
10) VR1-3 VR2-3 (10k B type Fixed) Gain Control at Record.
11) VR1-4 VR2-4 (10k B type Fixed) Input Control of Level Indicator.
12) VR1-5 VR2-5 (500k B type Fixed) Bias Current Control.
13) All Resistance Values in Ohms. k=1000 Ohms
14) All Capacitances with Decimal Values are in "μF". μ="μF" p="pF"="μμF"

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